REPORT TO THE BOARD OF FISHERIES NORTON SOUND RED KING CRAB FISHERY (Summer Fishery Only)

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1989 FISHERIES MANAGEMENT PLAN FOR NORTON SOUND SECTION RED KING CRAB FISHERY

INTRODUCTION

The Norton Sound Section consists of all waters in statistical area Q that are north of the latitude of Cape Romanzof, east of 1680 west longitude, and south of the latitude of Cape Prince of Wales (Figures 1 and 2). A large vessel summer commercial fishery has existed in this section since 1977. Limited local sales of king crab taken during the winter by Nome fishermen have also occurred for a number of years. Subsistence fishing for king crab occurs throughout the section during the winter.

STATUS-OF-STOCKS/RESEARCH

The Norton Sound king crab population in 1976 was largely composed of recruit and prerecruit crab. Crab abundance reached its peak in 1978 when 11 million pounds of legal male crab were estimated. Norton Sound king crab stock monitoring has included 5 trawl surveys and 4 pot assessment surveys from 1976-1985, and 7 winter studies from 1982-present. The results of the National Marine Fisheries Survey trawl and Alaska Department of Fish and Game pot assessment surveys are presented in Table 1. The most

recent population assessment work occurred during the late summer of 1988, after the summer commercial fishery, when a trawl survey was conducted by NMFS.

From 1979 to 1982, the population experienced very low recruitment and the fishery was almost entirely supported by older postrecruit crab. This is apparent from the average weight of individual crab captured in the commercial catch, which increased from 2.7 to 3.7 pounds/crab (Table 2). As a result of fishing and natural mortality, the abundance of legal crab dropped to an estimated 1.3 million pounds in 1982.

Increased abundance of sublegal crab in both the NMFS and ADF&G 1985 research surveys indicated that improved recruitment had resulted in a moderate increase in the abundance of legal crab. A preseason population estimate of 3 million pounds was made for the 1985 season based on catch per unit effort during the ADF&G pot survey. Further analysis of the survey data placed the legal male population at 2.4 million pounds. Based on the information collected in 1985 and the apparent stable level of recruitment, the 1987 pre-season harvest was set at 400,000 pounds. Unfortunately midway through the 1987 season it became apparent that recruitment levels had declined from the previous 5 year average (1982-1986) of 47% to 23%. The season was closed when 327,000 pounds had been caught. The average weight had increased to 3.2 pounds each from an average of 2.9.

Prior to the 1988 summer fishery, a conservative quota of 200,000 pounds of legal male crab was set for the Norton Sound Section. This reduced quota was based on data collected during the 1985 pot survey (ADF&G) and trawl survey (NMFS), which indicated slight declines in prerecruit levels of crab which would recruit into 1987 and 1988 fisheries. The level of recrtuitment observed during the 1987 commercial fishery seemed to also indicate a decline in recruitment for the 1988 season. With no current data available on the structure of the 1988 population, a very conservative quota was set. This quota was also derived by implementation of a Board of Fisheries management strategy which allowed a summer fishery exploitation rate of 1/2 the normal rate, in order to protect the winter fisheries. Evidence of lowered recruitment levels in 1987 also reduced the exploitation rate for the 1988 season. The 1988 summer commercial fishery harvest was 236,688 pounds.

The Nome area staff has conducted a winter sampling program since 1982. Comparisons of size composition between the winter catches and the summer commercial samples show similar recruitment trends. However, during the late winter and early spring months of 1988, no crab were captured by ADF&G since all gear was lost during fishing due to unstable ice conditions. The department staff plans to continue this research as an index of recruitment as funding and ice conditions allow.

STATUS-OF-FISHERY

Commercial catches made during the summer fishery have ranged from 2.9 million pounds in 1979 to 0.2 million pounds in 1982. Annual commercial catch data for this fishery are presented in Table 2. Deadloss was a major problem during 1977-79 but was largely eliminated after 1980 because crab were processed one or two days after being captured. Another factor reducing deadloss was that fishing and processing vessels have avoided inshore waters, which have a low surface salinity that crab cannot tolerate.

A winter commercial fishery also occurs from November 15 through May 15 when crab are taken through the ice. A total of 25,000 pounds was sold during the winter of 1978. During the past ten winters, less than 5,000 pounds has been sold each year due to poor weather, unstable ice conditions, a reported absence of crab from the nearshore area, and poor marketing conditions. During 1988, 425 crab were sold by 10 local fishermen. Again, unstable ice conditions severely hampered fishing effort near Nome during the winter fishery.

Red king crab are utilized by Norton Sound residents for both recreational and subsistence purposes with fishing occurring in

the winter through holes or cracks in the ice. The average catch per family in 1978 was about 70 crab with the average dropping to about 15 crab per family during the next four winters. Catches averaged 123 crab per family during the winter of 1983, 78 in 1984, 63 in 1985, 66 in 1986, and 59 in 1987, a large increase over the previous five winters. In 1988 the winter subsistence harvest from the Nome area was 2,724 king crab. seventy-one families received fishing permits. Of these 72 permits, fifty-eight were returned, with only 40 having been fished. Again, low effort levels were due to very unstable ice conditions for most of the winter. The average catch per fisher in 1988 was 68 crab, however, many subsistence fishers also reported heavy gear losses due to moving ice. Table 3 summarizes winter commercial and subsistence red king crab fishery data.

Following the 1988 summer fishery, the NMFS conducted a trawl survey. Preliminary results indicate the legal male king crab population prior to the summer fishery may have been as high as 3.3 million pounds. This figure is based o the estimate made by NMFS of 3.038 million pounds combined with the 1988 summer commercial harvest (237,000 pounds). The NMFS trawl survey was made just after the summer fishery, from August 16-30, and included some newly molted crab. If final analysis of the trawl survey data indicates the population estimate of 3.3 million is accurate, the summer harvest represented an exploitation of approximately 7.2% of the legal males available during the August fishery.

Further Investigations

The winter crab studies began as an index of nearshore crab abundance during the season of heaviest local subsistence use. Today some of the controversy of mining impacts on crab distribution has taken the place of previous controversy over commercial versus subsistence use of the resource. From the perspective of the local management biologists this documentation of crab abundance is important because it is presently the most objective comparison of crab availability to local people. Controversy over this preferred personal use resource is likely to continue in the future especially if winter crab harvests decline even for a short time.

The NMFS conducted their trawl survey of the Norton Sound section during 1988, on the "every three years" schedule as they have done since 1976. However, due to declining funding levels, they have informed the ADF&G that this is the last survey planned for the Norton Sound section in the near and distant future. Results of the 1988 survey, which are considered preliminary, indicated a population estimate of legal male crab significantly higher than estimated by ADF&G for the 1987 and 1988 seasons. Although these estimates were based on the best information available at the time, it clearly indicates that large vessel research is necessary to sample the population and project reasonably accurate population

estimates during any give year. This should serve to give notice that since NMFS will not be conducting a survey in Norton Sound in 1992, the burden of good biological data and population estimates of king crab in Norton Sound will fall on the State of Alaska. Plans for producing funding for future surveys in Norton sound should begin now if the Department is going to continue to exploit this resource commercially. Without good data and population estimates, proper monitoring and management of the red king crab resources cannot occur.

Outlook for 1989

Management Strategy

significant recruitment into the legal population occurred during each year from 1983-1986, but apparently declined in 1987 and 1988. The preliminary 1988 trawl survey data from NMFS indicates approximately 3.0 pounds of legal male crab will be available to the 1989 summer commercial fleet. This is considerably below the peak estimate of 11.0 million pounds in 1978. The population of legal male crab in Norton Sound is still considered to be depressed. With recruitment currently at an apparent low level (25% observed during both the 1988 summer fishery and NMFS trawl survey), and the requirement to provide for the subsistence fishery, the management staff recommends the conservative management strategy initiated in 1983 and implemented in 1984-88

be retained in 1989. The guideline harvest for the 1989 season will be 10% of the estimated population, or approximately 300,000 pounds of legal male crab.

Table 1. Catch of red king crab in Norton Sound during research surveys and resulting population estimates, 1976-1988.

Year	Date	Research Agency	Vessel		Number of	Red King C	ash Captured 1/	Population Estimates 3/ of Legal Hale crab	
					Sublegal Males	Legal 2/ Males	remales	Numbers	Pounds
1976	9/82 - 9/85 9/16 -18/87	Nes	Hiller- Preeman	Travl 158 Tows	768	555	160	3,119,888	0,111,480
1979	7/26 - B/\$5	NPS	Miller- Preeman	Trawl 71 Tows	46	. 194	46	837,241	2,511,723
1980	7/84 - 7/14	ADPLG	Altair	Pota 397 Lifte	443	3,298	158	1,988,999	6,699,989 4/
981	6/28 - 7/14	NDF4G	Altair	Pots 710 Lifts	4,897	3,415	1,933	1,285,195	4,755,221
982	7/86 - 7/28	ADPEG	Aleutian #1	Pota 689 Lifts	5,619	2,891	. 424	353,273	1,271,783
982	9/85 - 9/11	nme	Miller- Preeman	Trawl 50 Town	322	197	265	974,646	2,628,744
985	7/81 - 7/14	ADP&G	Arctic Sea	Pots 642 Lifts	6,986	4,645	. 181	967,579	2,414,644
985	9/16 -18/81	NPS	Агдову	Travl 78 Town	266	163	151	1,203,600	3,369,888
988		N#B		Trawl					

^{1/} Number of crab captured on ADPEG surveys represent data standardized for a 24 hour soak.

^{2/} Legal male red king crab were defined as at least 186 mm in carapace length for the 1976 NMFS survey; 185 mm for the 1979 and 1985 NMFS survey; and at least 121 mm in carapace width for all ADMAG surveys.

^{3/} Population estimates are valid for the date of the survey, is either before or after the summer commercial fishery.

^{4/} The 1980 estimate has been revised from the original estimate of 13.4 million pounds. The original estimate was thought inaccurate due to under-reporting of recovered tagged orab.

Table 2. Commercial harvest of red king crab in Norton Sound, summer fishery, 1977-1988.

Year	Legal male pop. est. 1/			Crab/ pot	Avg. wt.	Exvessel price	Fishery value millions \$	
2/4/ 1976	8.1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
1977 5/	10.0	Ø . 52	7	36	2.7	Ø.75	0.229	
1978 5/	11.0	2.09	8	64	3.0	Ø . 95	1.897	
1979 4/	5.4	2.93	34	28	3.0	Ø.75	1.878	
1980	6.6	1.19	9	29	3.6	0.75	0.890	
1981	4.7	1.38	36	11	3.7	Ø.85	1.172	
1982	1.3	Ø.23	11	6	3.6	2.00	0.405	
1983	2.1	Ø . 37	23	12	2.8	1.50	0.537	
1984	2.7	Ø . 39	8	14	2.8	1.02	Ø . 395	
1985	2.4	Ø.43	6	11	2.9	1.00	0.427	
1986 6/	2.8	Ø.48	3	,38	2.9	1.25	0.600	
1987 7/	2.2	Ø.33	9	10	3.2	1.50	0.491	
1988 7/	2.0	Ø.24	2	32	3.1	8/	8/	

^{1/} Population estimate prior to fishery in given year in millions of pounds.
2/ No commercial fishery in 1976.
3/ Millions of pounds.
4/ Population estimate derived by National Marine Fisheries Service.
5/ Population estimate derived from catch per pot from commercial fishery.
6/ Population estimate derived from 1985 ADF&G assessment survey.
7/ Population estimate based on 1985 assessment survey data and recruitment observed inseason; this estimate can only be approximated due to the lack of current assessment data.

^{8/} Data unavailable

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Table 3. Winter commercial and subsistence red king crab havrests, Norton Sound, 1978-1988.

Commercial					Sui				
Year 1/	Fisher- men	# Crab Harvested	Winter 2/	Permits Issued	Permits Returned	Permits Pished	Total Crab Caught 3/	Total Crab Harvested 4/	Average Harvest/fm
1978	37	9,625	1977-78	290	206	149	6/	12,506	84
1979	1	221	1978-79	48	43	38	6/	224	6
1980	1	22	1979-80	22	14	9	6/	213	24
1981	Ø	Ø	1980-81	51	39	23	6/	360	16
1982	1	17	1981-82	101	76	54	6/	1,288	24
1983	5	549	1982-83	172	106	85	6/	10,432	123
1984	8	856	1983-84	222	183	143	15,923	11,220	78
1985	9	1,168	1984-85	203	166	132	10,757	8,377	63
1986	5	2,168	1985-86	136	133	107	10,751	7,052	66
1987	7	1,040	1986-87	138	134	98	7,406	5,772	59
1988	10	425	1987-88	71	58	46	3,573	2,724	68

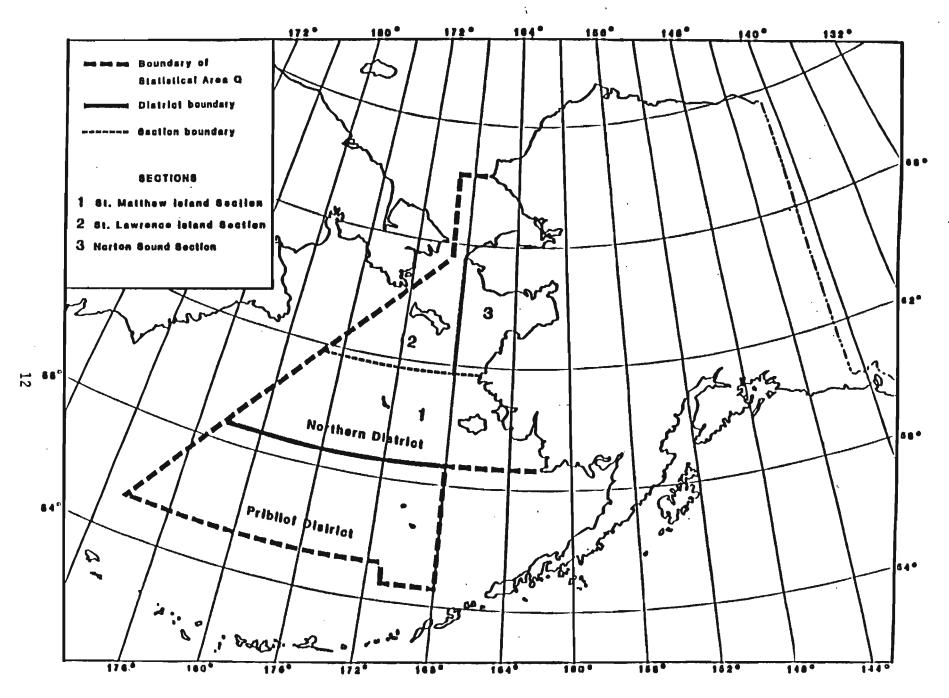
^{1/} Prior to 1985 the winter commercial fishery occurred from January 1-April 30; as of March 1985,
the winter commercial harvest may occur from November 15-May 15.

^{2/} The winter subsistence fishery occurs during months of two calendar years (as early as December through May).

^{3/} The number of crab actually caught; some may have been returned.

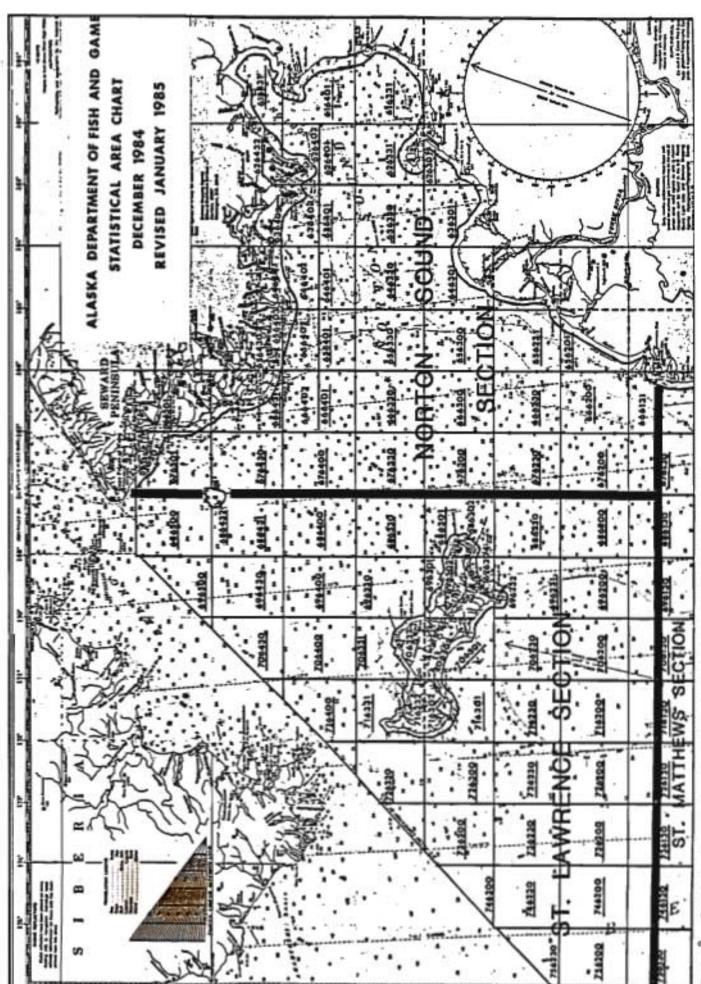
^{4/} The number of crab "harvested" is the number of crab caught and kept.

^{5/} Data unavailable.

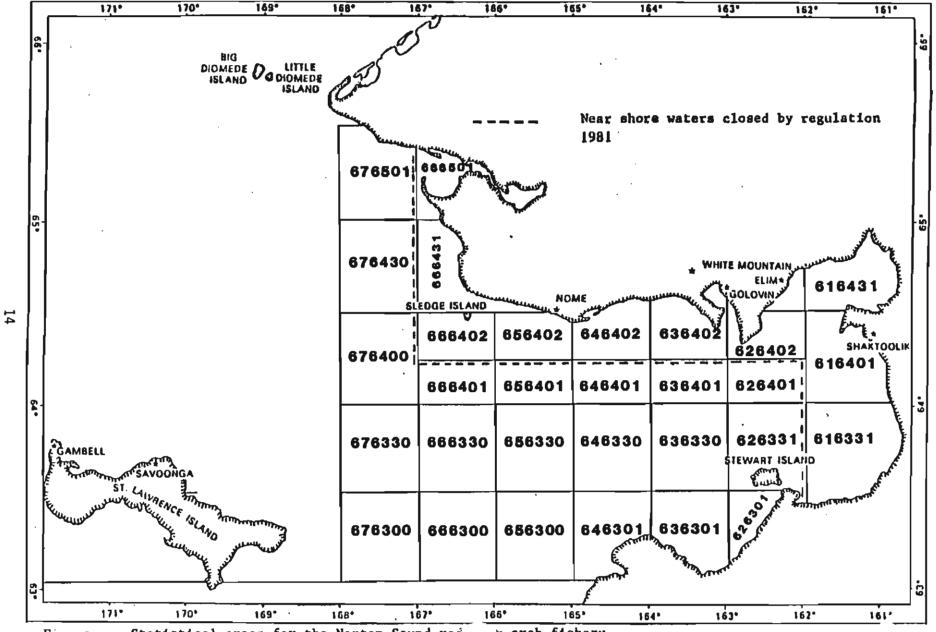


F' we 1. King crab fishing districts and sections ϵ matistical Area Q

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e 2. Statistical areas for the Northern District Red King Grab Fishery.



F 3 . Statistical areas for the Norton Sound reg & crab fishery.

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